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PRELIMINARY OBSERVATIONS ON DISPLAYS AND POSTURES IN THE ORIENTAL MAGPIE ROBIN *COPSYCHUS SAULARIS*¹

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(With one plate and two text-figures)

Key words: Visual displays, communication, *Copsychus saularis*, flight display, tail posture, courtship display, threat posture

Animals convey information to members of their own and other species through a number of channels. Changes in posture and colours are their means of visual communication. In the present study, efforts have been made to characterize types of visual signals and their importance in the social life of a song bird, the Oriental magpie robin *Copsychus saularis*. Observations revealed that this bird uses a number of visual signals for communication. Display flights and tail postures are used by the male to attract females. Males perform various courtship ceremonies, stretching the head forward and downward in front of females, spreading their tail feathers, left-right movement of neck, stretching the beak skywards in an ecstatic posture, and other actions that eventually lead to coition. When an intruder arrives in the male's territory it displays a threatening posture by raising its head and sleekening the plumage. Nestlings and fledglings use specific begging display by quivering their wings and demanding food. In addition, one type of resting and three types of sleeping postures have been observed.

INTRODUCTION

Physical display or posture is one of several means of animal communication, as a wider range of expression is possible by visual rather than vocal, chemical or tactile means. Birds are known to use visual signals (Collias 1943, Armstrong 1965, Butcher and Rohwer 1989). Special postures and movements are often used to display these signals. Many methods have been developed by birds for switching visual signals

on and off by movements of the head, body, tail, wings and body feathers (Marler and Hamilton 1966). It is believed that species-specific morphological features of an animal may be ritualized ('ritualization' refers to the evolutionary modification of movements and structure to improve their signal function) and act as sign stimuli to which other members of the species respond instinctively (Krebs and Davies 1987). In the social context, these sign stimuli are termed 'social releasers' e.g. the red spot on the bill of herring gull has all the characteristics of a sign stimulus. In ethological terms, the red spot of the bill releases the begging response of the chick (Tinbergen 1951).

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Visual displays or postures in birds perform a variety of functions. The head-up posture is frequently used in fighting and territorial defence in many passerine families (Marler 1961). Aggressive displays often involve an apparent increase in size (Tinbergen 1959, Marler 1961). The main weapons of many birds are the bill and wings, and these are often maximally presented to the opponent in a 'head-forward' posture (Andrew 1961). Many visual signals are directed partially or entirely towards members of the opposite sex, coordinating reproductive activities. The ornamentation of plumage is widely used by the birds to synchronize the reproductive process and mate acquisition (Mayr 1956, Butcher and Rohwer 1989). Colourful marks on various species, especially on the beak, are used by birds for parent-offspring recognition (Tinbergen 1959).

Despite the rich avifauna in the Indian subcontinent (about 1,228 resident species), our knowledge of displays and postures of Indian birds is scanty and based on fragmented observations made by ornithologists, naturalists and bird watchers (Ali 1996, Ali and Ripley 1998). According to Ali (1996), 'our greatest need today is for careful and rational field work on living birds in their natural environment'. Thus, an attempt has been made to study the types of displays and postures and their sociobiological importance in the Oriental magpie robin *Copsychus saularis*.

MATERIAL AND METHODS

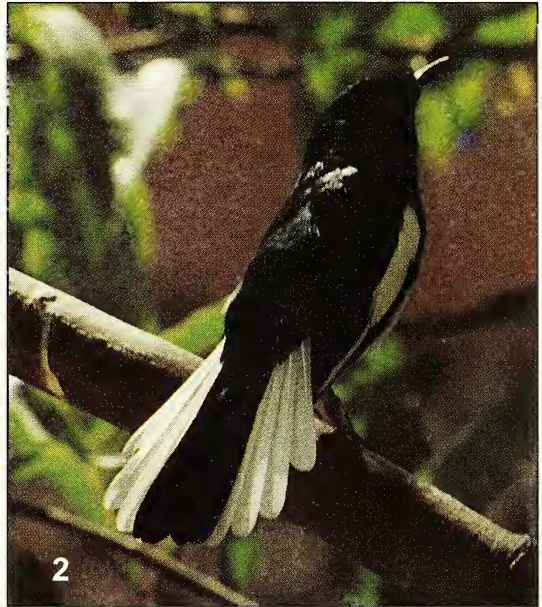
The Oriental magpie robin (Family Muscicapidae, Subfamily Turdinae) is a conspicuously pied black and white bird, distributed throughout the Indian subcontinent, up to about 2,500 m above msl, absent in arid areas and is divided into three races on minor size and colour differences. It is a common plains species, avoiding both dense forest and open bare plain and prefers groves and gardens. The male

is glossy black and white with graduated long, white tail, with two central pairs of black feathers. The black portions of the male are replaced by a brownish, slaty grey in female. It is one of the best songsters in a land where singing birds are scarce (Whistler 1949, Ali 1996).

Field observations were made from January 1995 to December 1998 on 33 individuals (24 males and 9 females) in and around Gurukul Kangri University campus, Haridwar (29° 55' N, 78° 8' E). The habitat was composed of gardens and crop fields, divided by hedges and tree rows, while houses/offices were often in close proximity. Data was collected by visiting each site once a week, between early morning and late evening, using a binocular (7 x 50). Displays were recorded with the help of SONY handycam video camera and Pentax still photography camera with telelens (300-600 mm). To determine the information conveyed by a signal, the circumstances in which the signal occurred were examined. The characteristics and components of different displays were defined, analyzing video films and still photographs.

RESULTS

1. **Flight display:** An important display in this species. The male uses flight display in the early phase of the breeding season (i.e. March and April). When a male sees a female in his territory, he flies towards her. Before approaching her, he stalls in flight for a few seconds. In most cases (n=16), the flight display may last for 4-10 sec (\bar{x} =7.38 \pm 0.46). However, in some cases (n=6) it can last for 20 sec (\bar{x} =18.83 \pm 0.55). This distinctive and conspicuous display flight has two components: undulating flight with fully spread wing and tail feathers (Plate 1, Fig. 1) and a highly varied, complex song to attract the female. The male also uses undulating flight with threat calls when predators (spotted owlet, snake, mongoose) appear in his territory.



Figs (1-4): Magpie robin *Copsychus saularis*, 1: Flight display of male, 2. Tail display of male, 3. Head forward (threat) posture of male, 4. Resting posture during winter.

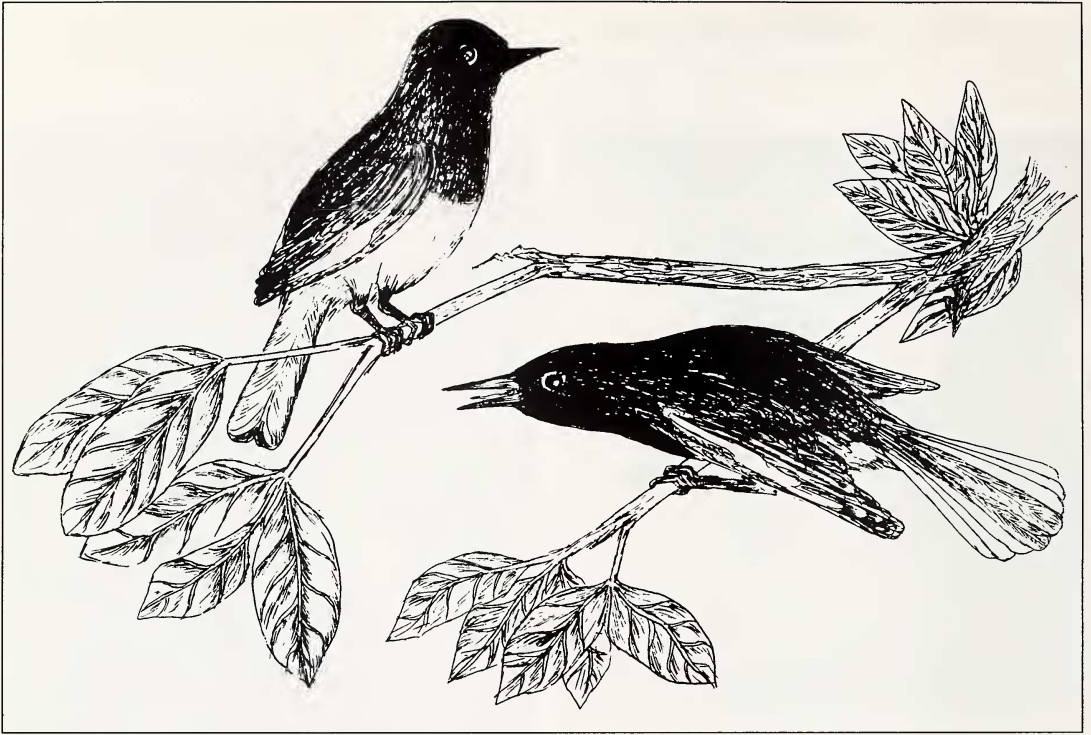


Fig. 1: Courtship display, male magpie robin in front of the female

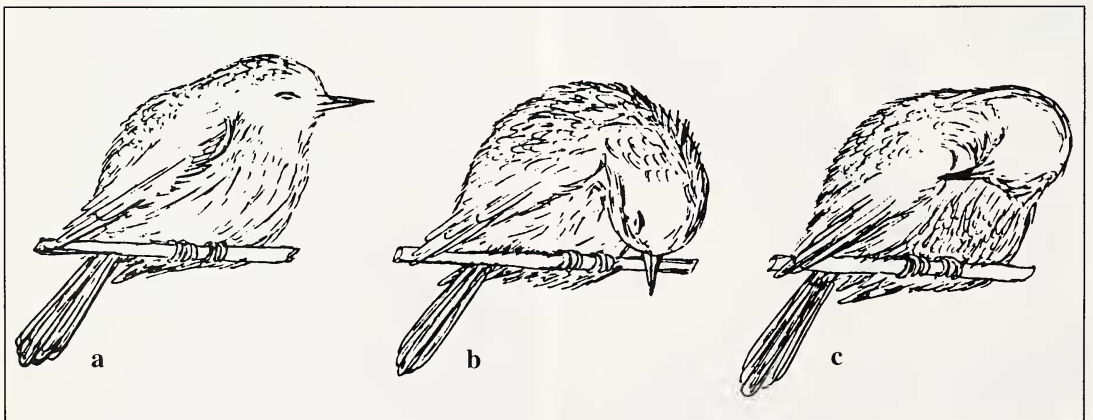


Fig. 2: Sleeping postures exhibited by magpie robin (a) Neck shrinking posture (b) Neck hanging posture (c) Neck turning posture.

2. Tail posture: The male magpie robin uses this posture only until mating is completed. He sits on a horizontal perch and fans out his tail (Plate 1, Fig. 2) for about 5 sec. ($\bar{x}=5.09 \pm 0.35$, $n=22$), to show the white tail feathers which are normally covered by the black, middle tail feathers. After returning to his normal position, he selects another branch and repeats the posture. The male repeats this posture 4-9 times ($\bar{x}=5.29 \pm 0.48$, $n=24$) at a stretch. The male normally shows the dorsal side of his tail feathers. However, sometimes he also exhibits an antero-ventral side. Most males ($n=18$) displayed the tail posture after pair formation, but in some cases ($n=6$) it was prior to pair formation and also when the territory owner saw a female approaching his territory.

3. Courtship display: A dance-like display performed by the courting male bird in the presence of a female. There are two types of courtship displays: (A) The male sits on a perch, stretches his head forward and downward, simultaneously displaying his tail feathers. He also moves his neck slightly to the right and left a number of times, simultaneously flapping his wings like a begging juvenile. (B) The male starts walking on a wall with his head towards the female. After walking about a metre, he halts, turns his head up and points his bill towards the sky (at about 60° to the horizontal plane) for 2-4 seconds ($\bar{x}=2.75 \pm 0.21$, $n=12$), with his tail outspread. After this, he starts walking towards the female, finally performing the 'A type' display (Fig. 1). The 'A type' behaviour is more common than the 'B type'.

4. Threat posture: When an intruder arrives in the territory of a male, the territory owner shows a specific threatening posture (Plate 1, Fig. 3) before chasing and fighting the rival. In this posture, the male turns his head up and sleekens the plumage, facing the rival. If the intruding rival does not escape immediately, a fight follows, in which the submissive individual delivers submissive calls.

5. Begging display: The nestlings and fledglings were observed using this display. It is interesting to note that the newly hatched young open their beaks after receiving even a slight jerk, caused by the perching of the parents on any branch of the nesting tree. However, once the nestlings open their eyes, they respond only after seeing the parents. After their wings develop, they shake them to make the display more effective. Begging display is generally accompanied by begging calls.

6. Resting posture: In winter, when the magpie robin rests in the day, it curls up its body and fluffs the body feathers into an almost spherical shape (Plate 1, Fig. 4). This posture is adopted by many bird species, to save body heat during winter.

7. Sleeping posture: The magpie robin was observed in three types of sleeping postures, i.e. neck hanging posture (NHP), neck turning posture (NTP), and neck shrinking posture (NSP) (Fig. 2). Most individuals (66.4%) use the NTP during sleep — the bird turns its neck so that its shape appears deformed. Predators cannot recognize the bird easily in this cryptic appearance. NHP and NSP also deform the shape of the sleeping bird, protecting it from predators. But NHP (28%) and NSP (5.6%) were used for short duration only. The bird may have been less comfortable in these postures.

8. Wing drooping display: In this display, the magpie robin stretches its tail upwards and then droops it in a few steps. Simultaneously, it droops its wings in the same sequence. This posture is observed during the post-breeding phase. Its biological significance, however, is not yet clear.

DISCUSSION

It has been suggested that display flights are directed at females and associated with the male quality, or sometimes function in male-male

interactions to defend territory (Andersson 1982, McGregor *et al.* 1990). The magpie robin exhibits individual differences in song quality (Bhatt and Kumar 1998a b, Kumar 1999) and there are suggestions that these may be associated with variations in strength or fighting ability (Krebs and Davies 1987). When different males engaged in song production exhibit differences in song quality, the female has an opportunity to select a male that exhibits more strength through his song signal than other courting males. In the present study, the magpie robin used flight display in the presence of a female or predator. From this it can be inferred that flight display, like song, also helps the male to show his strength, to attract a female or repel predators. Flight displays have also been reported in other birds like the jay *Garrulus glandarius*. (Goodwin 1956), fantail warblers *Cisticola juncidis* (McGregor *et al.* 1990), and white-throated manakin *Corapipo gutturalis* (Davis 1982, Prum 1986, Gaunt 1994). However, the acoustical features of the song/calls of these species are less varied than magpie robin. Therefore, in these birds with simple song/calls, the development of visual display for mate attraction is understandable, but in species like magpie robin where vocalization is complex and varied, the interpretation of the genesis of flight display is rather difficult. Observations revealed that the male used not only flight display, but also tail display to attract the female. Obviously, this bird has a good repertoire of both vocal and visual signals.

In almost all avian species, courtship behaviour is exhibited by males. The bird may reveal his gaudy nuptial plumage, spread his tail feathers, erect his crest or inflate brilliantly coloured patches, parade, dance, fly with dizzying aerobatics, sing his most fetching songs all this just to impress his prospective mate (Welty and Baptista 1988). Courtship stimulates sexual readiness, not only in the bird being

courted, but also in the courting bird, through self stimulation. This reciprocal stimulation may be the chief function of the mutual courtship ceremonies of many colonial birds such as gannets, gulls and penguins. Such stimulation commonly results in the increase of sex hormones in a bird's body, which in turn intensifies courtship display (Welty and Baptista 1988).

The courtship display of magpie robin is simple and takes little time (16 ± 3.2 sec, $n=4$). It is believed that species with complex songs and pronounced territories often have rather simple courtship displays, whereas species with small territories and simple or no songs generally have more elaborate courtship displays. It may be that pronounced territoriality and song serve, in part, to initiate pair formation and maintenance throughout the breeding period. When territories are small and/or songs are absent, displays seem to serve the function of pair bonding. In colonial birds, these displays may continue throughout the nesting cycle as a device to ensure individual recognition between the paired birds (Faaborg and Chaplin 1988).

The threat posture appears to help minimize the cost of territory defence by avoiding chasing/fighting the rival. Like the magpie robin, head-up posture is used by several species of birds for territory defence and fighting (Marler and Hamilton 1966). It has generally been observed that aggressive displays often involve an increase in apparent size. Larger animals dominate smaller ones in many species, and intimidating or repelling signals often maximize this particular property (Tinbergen 1959, Marler 1961). The 'head-forward display' is used not only for threatening, but also for pairing with females by many male finches (Hinde 1956).

Begging display is common in birds, and almost every avian nestling uses it to demand food from parents (McFarland 1995a, b, Alcock 1988). Our causal observations revealed that higher frequency of wing-movement (quivering)

might stimulate parents to feed young ones more frequently as compared to low frequency quivering. In addition, it may strengthen the flight muscles of the wings. The inside of the beak of a magpie robin nestling is bright yellow, which helps parents locate the exact position of the nestlings' mouths while feeding them in the dark environment of the nest hole/nest-box.

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REFERENCES

- ALI, S. (1996): The Book of Indian Birds. Bombay Natural History Society and Oxford University Press, Bombay. 12th edn, xx+280 pp.
- ALI, S. & S.D. RIPLEY (1998): Handbook of the Birds of India and Pakistan. Oxford University Press, Bombay. Vol. 8 & 9, 2nd edn.
- *ALCOCK, J. (1988): Animal Behaviour: An Evolutionary Approach. Sinauer Associates Inc. Publishers, Sunderland, Massachusetts, USA.
- ANDERSSON, M. (1982): Female choice selects for extreme tail length in a Widowbird. *Nature* 299: 818-820.
- ANDREW, R.J. (1961): The displays given by passerines in courtship and reproductive fighting. A review. *Ibis* 103A: 315-348.
- *ARMSTRONG, E.A. (1965): Bird display and behaviour. Dover Publications, New York.
- BHATT, D. & A. KUMAR (1998a): Acoustic signals in birds: Songs and calls. *Jour. Acoust. Soc. Incl. XXVI(3&4)*: 325-337.
- BHATT, D. & A. KUMAR (1998b): Singing behaviour in Oriental magpie robin *Copsychus saularis*. *Ostrich* 69 (No. 3 & 4): 242.
- BUTCHER, G.S. & S. ROHWER (1989): The evolution of conspicuous and distinctive coloration for communication in birds. *In: Current Ornithology* Vol. 6 (Power, D.M. ed.), New York: Plenum Press, pp. 51-108.
- COLLIAS, N.E. (1943): Statistical analysis of factors which make for success in initial encounters between hens. *Amer. Nat.* 77: 519-538.
- DAVIS, T.H. (1982): A flight-song display, of the White-throated manakin. *Wilson Bull* 94: 594-595.
- *FAABORG, J. & S.B. CHAPLIN (1988): Ornithology: An Ecological Approach. New Jersey: Prentice Hall, Englewood Cliffs.
- GAUNT, S.L., L.F. BAPTISTA, J.E. SANCHEZ & D. HERNANDEZ (1994): Song learning as evidenced from song sharing in two Hummingbird species (*Colibri coruscans* and *Colibri thalassinus*). *The Auk* 111(1): 87-103.
- GOODWIN, D. (1956): Further observations on the behaviour of the Jay *Garrulus glandarius*. *Ibis* 98: 186-219.
- HINDE, R.A. (1956): A comparative study of the courtship of certain finches (Fringillidae). *Ibis* 98: 1-23.
- *KREBS, J.R. & N.B. DEVIES (1987): An Introduction to Behavioural Ecology. Blackwell Scientific Publications, London.
- KUMAR, ANIL (1999): Characteristics and significance of calls, songs and visual displays in two avian species viz. *Copsychus saularis* & *Pycnonotus cafer*. Ph.D. Thesis, Gurukul Kangri University, Haridwar, India.
- MARLER, P. (1961): The evolution of visual communication. *In: Vertebrate speciation*, ed. Blair, W.F., University of Texas Press, Austin, USA. pp. 96-121.
- MARLER, P. & J. HAMILTON (1966): Mechanisms of animal behaviour. John Wiley and Sons, New York.
- MAYR, E. (1956): Gesang and Systematik, *Beitr. Vogelkunde* 5: 112-117.
- McFARLAND, D. (1995a): Displacement Activities. *In: Animal Behaviour: Psychobiology, Ethology and Evolution*, ELBS, The Bath Press, Avon, pp. 381-393.
- McFARLAND, D. (1995b): Ritualization and Communication. *In: Animal Behaviour: Psychobiology, Ethology and Evolution*, ELBS, The Bath Press, Avon, 349-410.
- MCGREGOR, P.K., H.S. CLAYTON, U. KOLB, P. STOCKLEY & R.J. YOUNG (1990): Individual differences in the displays of Fan-tailed warblers *Cisticola juncidis*, association with territory and male quality. *Ibis* 132: 111-118.
- PRUM, R.O. (1986): The displays of the White-throated Manakin *Corapipo gutturalis* in Surinam *Ibis* 128: 91-102.
- *TINBERGEN, N. (1951): The study of Instinct. Oxford University Press, London.
- TINBERGEN, N. (1959): Comparative studies of the behaviour of gulls (Laridae): A progress report. *Behaviour* 15: 1-70.
- WELTY, J.C. & L.F. BAPTISTA (1988): The life of birds. Saunders College Publishing, USA.
- WHISTLER, H. (1949): A Popular Handbook of Indian Birds. Oliver and Boyd Ltd., London. Pp 108.
- * Original not referred.